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TITLE: Organic EL device and preparation method

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Application Filing Date - APD (1):

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Claims Text - CLTX (2):

1. An organic EL device comprising a cathode, an anode, and two or more stacked organic layers therebetween including a light emitting layer, at least one layer of said two or more organic layers being formed by coating, wherein the organic layer disposed close to the cathode is an electron injecting organic layer containing at least one compound selected from organic metal salts and organic metal complexes of a metal having a standard electrode potential of more negative than -1.8 V at 25.degree. C., and formed by coating, and an organic layer containing a high molecular weight EL material is disposed close to the electron injecting organic layer on the cathode side.

Claims Text - CLTX (3):

2. An organic EL device according to claim 1 wherein said metal has a standard electrode potential of from -3.1 V to -2.2 V at 25.degree. C.

Claims Text - CLTX (6):

5. An organic EL device according to claim 1 wherein the electron injecting organic layer disposed close to the cathode contains an organic metal complex which has a ligand of the following formula (L-1): 15 wherein R.sub.1, R.sub.2 and R.sub.3 are each independently hydrogen, an alkyl or aryl group, and R.sub.2 and R.sub.3 may bond together to form a ring.

Claims Text - CLTX (8):

7. An organic EL device according to claim 6 wherein the high molecular weight EL material is selected from the group consisting of polyfluorene and derivatives thereof, poly(p-phenylene vinylene) and derivatives thereof, poly(biphenylene vinylene) and derivatives thereof, poly(terphenylene vinylene) and derivatives thereof, poly(naphthylene vinylene) and derivatives thereof, poly(thienylene vinylene) and derivatives thereof, polythiophene and derivatives thereof, polyvinyl compounds, polyacrylate derivatives, and polymethacrylate derivatives.

Claims Text - CLTX (9):

8. An organic EL device according to claim 1 wherein the electron injecting organic layer disposed close to the cathode further contains an electron transporting material which is a compound having an oxadiazole ring, triazole ring, quinoxaline ring, phenanthroline ring, quinolinol ring, thiadiazole ring, pyridine ring or cyano group.

Claims Text - CLTX (10):

9. An organic EL device according to claim 1 wherein the electron injecting organic layer disposed close to the cathode has been coated and crosslinked.

Claims Text - CLTX (11):

10. A method for preparing an organic EL device comprising a substrate, a first electrode on the substrate, two or more stacked organic layers including a light emitting layer on the first electrode, and a second electrode formed on the organic layers, at least one layer of said two or more organic layers being formed by coating, wherein an organic layer containing a high molecular weight EL material and an electron injecting organic layer containing at least one compound selected from organic metal salts and organic metal complexes of a metal having a standard electrode potential of more negative than -1.8 V at 25.degree. C. are formed in a stacked manner, the electron injecting organic layer is formed close to the first or second electrode by coating.

Claims Text - CLTX (12):

11. A method for preparing an organic EL device according to claim 10, wherein the first electrode is an anode, the second electrode is a cathode, the organic layer containing a high molecular weight EL material is formed as a lower side organic layer, the electron injecting organic layer containing at least one compound selected from organic metal salts and organic metal complexes of a metal having a standard electrode potential of more negative than -1.8 V at 25.degree. C. is formed as an upper side organic layer lying on the lower side organic layer, by coating a solution of the at least one compound in a solvent which is selected from the group consisting of (i) a chain compound of 3 to 6 carbon atoms in total, having on the molecule at least one alkoxy group of 1 to 3 carbon atoms, carbonyl group, or ester group of 2 to 3 carbon atoms, and a hydroxyl group at the .alpha.- and/or .beta.-position thereto, (ii) a chain compound of 3 to 6 carbon atoms in total, having on the molecule a dialkylamide group of 2 to 4 carbon atoms, (iii) an ester form of chain compound having 5 to 8 carbon atoms in total, and (iv) a carbonate form of chain compound having 4 to 7 carbon atoms in total, and the cathode is formed on the electron injecting organic layer serving as the upper side

organic layer.

Claims Text - CLTX (14):

13. An organic EL device comprising a cathode, an anode, at least one organic layer therebetween including a light emitting layer, an electron injecting layer between the cathode and the organic layer, wherein the electron injecting layer contains at least one salt selected from inorganic metal salts and organic metal salts of a metal having a standard electrode potential of from -1.8 V to -0.8 V at 25.degree. C.

Claims Text - CLTX (15):

14. An organic EL device according to claim 13 wherein said metal has a standard electrode potential of from -1.7 V to -1.15 V at 25.degree. C.

Claims Text - CLTX (19):

18. An organic EL device comprising, in order, a substrate, a first electrode on the substrate, two or more stacked organic layers on the first electrode including a light emitting layer, and a second electrode on the organic layers, wherein at least one layer of the two or more stacked organic layers other than the light emitting layer contains at least one high or low molecular weight compound selected from the group consisting of oxadiazole, triazole, thiadiazole, quinoline, quinoxaline, phenanthroline, and derivatives thereof, the light emitting layer contains a .pi.-conjugated polymer, polyvinyl compound, polyacrylate, polymethacrylate or a derivative thereof, and the organic layers are formed by coating.

Claims Text - CLTX (20):

19. An organic EL device according to claim 18 wherein the second electrode is made of a metal salt, metal oxide or metal alloy.

Claims Text - CLTX (21):

20. An organic EL device according to claim 18, wherein the first electrode is an anode, the second electrode is a cathode, the light emitting layer is formed as a lower side organic layer, the at least one layer containing at least one high or low molecular weight compound selected from the group consisting of oxadiazole, triazole, thiadiazole, quinoline, quinoxaline, phenanthroline, and derivatives thereof is formed as an upper side organic layer lying on the lower side organic layer, by coating a solution of the at least one high or low molecular weight compound in a solvent which is selected from the group consisting of (i) a chain compound of 3 to 6 carbon atoms in total, having on the molecule at least one alkoxy group of 1 to 3 carbon atoms, carbonyl group, or ester group of 2 to 3 carbon atoms, and a hydroxyl group at

the .alpha.- and/or .beta.-position thereto, (ii) a chain compound of 3 to 6 carbon atoms in total, having on the molecule a dialkylamide group of 2 to 4 carbon atoms, (iii) an ester form of chain compound having 5 to 8 carbon atoms in total, and (iv) a carbonate form of chain compound having 4 to 7 carbon atoms in total.

Claims Text - CLTX (23):

22. An organic EL device according to claim 21 wherein the polymer in the light emitting layer is selected from the group consisting of polyfluorene and derivatives thereof, poly(p-phenylene vinylene) and derivatives thereof, poly(biphenylene vinylene) and derivatives thereof, poly(terphenylene vinylene) and derivatives thereof, poly(naphthylene vinylene) and derivatives thereof, poly(thienylene vinylene) and derivatives thereof, polythiophene and derivatives thereof, polyvinyl compounds, polyacrylate derivatives, and polymethacrylate derivatives.